WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising:

a first step of forming an amorphous semiconductor film containing silicon on a substrate having an insulating surface;

a second step of introducing into the amorphous semiconductor film a catalyst element for promoting crystallization of the amorphous semiconductor film;

a third step of crystallizing the amorphous semiconductor film by a heat treatment;

a fourth step of selectively introducing into the silicon-containing semiconductor film obtained in the third step an impurity element belonging to Group 15; and

a fifth step of gettering the catalyst element by heat treatment to the region into which the impurity element is introduced,

wherein the heat treatment in the fifth step is performed in the temperature range not exceeding a glass transition point of the substrate.

2. A method according to claim 1, wherein the silicon-containing semiconductor film obtained in the third step is a crystalline semiconductor film having grain boundaries.

3. A method according to claim 1, wherein the heat treatment in the fifth step is performed in the temperature range of from 550 to 650°C.

4. A method according to claim 1, wherein the substrate is a glass substrate.

5. A method according to claim 1, wherein the heat treatment is furnace annealing.

6. A method according to claim 1, wherein the silicon-containing semiconductor film contains germanium.

7. A method according to claim 1, wherein the catalyst element is at least one element selected from the group of elements consisting of Ni, Co, Fe, Pd, Pt, Cu, and Au.

8. A method according to claim 1, wherein the impurity element belonging to Group 15 is at least one element selected from the group of elements consisting of P, N, As, Sb, and Bi.

9. A method of manufacturing a semiconductor device, comprising:

a first step of forming an amorphous semiconductor film containing silicon on a substrate having an insulating surface;

a second step of selectively introducing into the amorphous semiconductor film a catalyst element for promoting crystallization of the amorphous semiconductor film;

a third step of crystallizing at least a part of the amorphous semiconductor film by a heat treatment;

a fourth step of selectively introducing into the

silicon-containing semiconductor film obtained in the third step, an impurity element belonging to Group 15; and

a fifth step of gettering the catalyst element by a heat treatment to the region into which the impurity element is introduced,

wherein the heat treatment in the fifth step is performed in the temperature range not exceeding a glass transition point of the substrate.

10. A method according to claim 9, wherein the silicon-containing semiconductor film obtained in the third step is a crystalline semiconductor film having grain boundaries.

11. A method according to claim 9, wherein the heat treatment in the fifth step is performed in the temperature range of from 550 to 650°C.

12. A method according to claim 9, wherein the substrate is a glass substrate.

13. A method according to claim 9, wherein the heat treatment is furnace annealing.

14. A method according to claim 9, wherein the silicon-containing semiconductor film contains germanium.

15. A method according to claim 9, wherein the catalyst

element is at least one element selected from the group of elements consisting of Ni, Co, Fe, Pd, Pt, Cu, and Au.

16. A method according to claim 9, wherein the impurity element belonging to Group 15 is at least one element selected from the group of elements consisting of P, N, As, Sb, and Bi.

17. A method of manufacturing a semiconductor device, comprising:

a first step of forming an amorphous semiconductor film containing silicon on a substrate having an insulating surface;

a second step of introducing into the amorphous semiconductor film a catalyst element for promoting crystallization of the amorphous semiconductor film;

a third step of crystallizing the amorphous semiconductor film by a heat treatment;

a fourth step of irradiating a laser light or an intense light to the silicon-containing semiconductor film obtained in the third step;

a fifth step of selectively introducing into the silicon-containing semiconductor film obtained in the fourth step an impurity element belonging to Group 15; and

a sixth step of gettering the catalyst element by a heat treatment to the region into which the impurity element is introduced,

wherein the heat treatment in the sixth step is performed in the temperature range not exceeding a glass

transition point of the substrate.

18. A method according to claim 17, wherein the silicon-containing semiconductor film obtained in the fourth step is a crystalline semiconductor film having grain boundaries.

19. A method according to claim 17, wherein the heat treatment in the sixth step is performed in the temperature range of from 550 to 650°C.

20. A method according to claim 17, wherein the substrate is a glass substrate.

21. A method according to claim 17, wherein the heat treatment is furnace annealing.

22. A method according to claim 17, wherein the silicon-containing semiconductor film contains germanium.

23. A method according to claim 17, wherein the catalyst element is at least one element selected from the group of elements consisting of Ni, Co, Fe, Pd, Pt, Cu, and Au.

24. A method according to claim 17, wherein the impurity element belonging to Group 15 is at least one element selected from the group of elements consisting of P, N, As, Sb, and Bi.

25. A method of manufacturing a semiconductor device, comprising:

a first step of forming an amorphous semiconductor film containing silicon on a substrate having an insulating surface;

a second step of selectively introducing into the amorphous semiconductor film a catalyst element for promoting the crystallization of the amorphous semiconductor film;

a third step of crystallizing at least a part of the amorphous semiconductor film by a heat treatment;

a fourth step of irradiating a laser light or an intense light to the silicon-containing semiconductor film obtained in the third step;

a fifth step of selectively introducing into the silicon-containing semiconductor film obtained in the fourth step an impurity element belonging to Group 15; and

a sixth step of gettering the catalyst element by a heat treatment to the region into which the impurity element is introduced,

wherein the heat treatment in the sixth step is performed in the temperature range not exceeding a glass transition point of the substrate.

26. A method according to claim 25, wherein the silicon-containing semiconductor film obtained in the fourth step is a crystalline semiconductor film having grain boundaries.

27. A method according to claim 25, wherein the heat treatment in the sixth step is performed in the temperature range of from 550 to 650°C.

28. A method according to claim 25, wherein the substrate is a glass substrate.

29. A method according to claim 25, wherein the heat treatment is furnace annealing.

30. A method according to claim 25, wherein the silicon-containing semiconductor film contains germanium.

31. A method according to claim 25, wherein the catalyst element is at least one element selected from the group of elements consisting of Ni, Co, Fe, Pd, Pt, Cu, and Au.

32. A method according to claim 25, wherein the impurity element belonging to Group 15 is at least one element selected from the group of elements consisting of P, N, As, Sb, and Bi.